

546 2¹³ 1. An interconnect network for operation within a communication node, said network comprising,

5 a selectable number of local interconnect modules located proximate to each other and each having local transfer elements for transferring information between a plurality of local I/O channels and for transferring information between said plurality of local I/O channels and a plurality of non-local I/O channels, and

10 an expanded interconnect module located proximate to said local interconnect modules and having coupling means for electrically coupling to said non-local I/O channels, and expanded transfer elements for transferring information between said local interconnect modules.

15 2. An interconnect network according to claim 1 wherein said local transfer elements include means for synchronizing information transferred between each of said local transfer elements.

20 3. An interconnect network according to claim 1 wherein said expanded transfer elements include means for synchronizing information transferred between said local interconnect modules.

546 2¹⁴ 4. An interconnect network according to claim 1 further comprising hot-swap means for changing the selected number of said local communication modules included
25 in said interconnect network, while said interconnect network is operating transferring information.

30 5. An interconnect network according to claim 1, wherein said local I/O channels have an associated priority and said interconnect network further comprises QoS means for transferring information from one of said local I/O channels having a relatively higher priority in preference to transferring information from one of said local I/O channels having a relatively lower priority.

6. An interconnect network according to claim 1, wherein said local I/O channels have an associated availability for receiving information, and said interconnect network further comprises, status means for maintaining a status indicative of said associated
5 availability for one or more of said local I/O channels, and back pressure means for communicating said status out of said local I/O channels.

7. An interconnect network according to claim 6, wherein said local interconnect modules further include a plurality of memory queues, said plurality of local I/O
10 channels having associated memory queues, and said memory queues having means for storing information received by way of an associated local I/O channel.

8. An interconnect network according to claim 7 further comprising means for setting said status corresponding to a particular one of said local I/O channels to indicate
15 unavailability for receiving information in response to said associated queue of said particular local I/O channel reaching a selectable content level.

9. An interconnect network according to claim 7, wherein information coupled into
and out of said network has an associated priority, and said network further comprises
20 means for setting said status corresponding to a particular one of said local I/O channels to indicate unavailability for receiving information having a particular priority, in response to said associated queue of said particular transceiver reaching a selectable content level.

10. An interconnect network according to claim 6, wherein information transferred through said interconnect modules includes a data portion and a destination address portion, said destination address portion specifying through which one of said local I/O channels said information is to be transferred out of said interconnect network, and said back pressure means is adapted for replacing said destination address portion with said
30 status for communicating said status out of said interconnect network.

11. An interconnect network according to claim 1 further comprising redundancy generating means for generating an alternative version of information being transferred out of said interconnect network through said local I/O channels.

5 12. An interconnect network according to claim 11, wherein said interconnect network is adapted for transferring information as information cells, each of said cells including groups of information words, and wherein said redundancy generating means is adapted for causing said alternative version of said information to be a bit-by-bit "exclusive-or" between pairs of said groups of information words included in an
10 information cell.

13. An interconnect network according to claim 1, wherein said interconnect network is adapted for transferring information as information cells, and said local transfer elements further include means for substantially simultaneously transferring a
15 plurality of said information cells out of said local interconnect modules.

14. An interconnect network according to claim 13 further comprising a memory queue for intermediately storing said plurality of information cells to be transferred, and queue detection means for detecting when a selected number of said information cells
20 are stored in said memory queue, wherein said local transfer elements are adapted for transferring said plurality of information cells in response to said queue detection means detecting storage of said selected number of said information cells.

15. An interconnect network according to claim 1, wherein said interconnect
25 network is adapted for transferring information as information cells, and said expanded transfer elements further include means for substantially simultaneously transferring a plurality of said information cells out of said expanded interconnect module.

16. An interconnect network according to claim 15 further comprising a memory
30 queue for intermediately storing said plurality of information cells to be transferred, and queue detection means for detecting when a selected number of said information cells are stored in said memory queue, wherein said expanded transfer elements are adapted

for transferring said plurality of information cells in response to said queue detection means detecting storage of said selected number of said information cells.

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17. An interconnect network according to claim 1, wherein said local I/O channels
5 have associated destination addresses, and said expanded interconnect module includes,

array means for storing path information representative of a plurality of paths
through said expanded transfer elements over which information from a first local I/O
channel of one of said local interconnect modules can be transferred to a second local
10 I/O channel of another one of said local interconnect modules, and

index means for selecting appropriate path information from said array means, at
least partially in response to a destination address of said second local I/O channel.

18. An interconnect network according to claim 1, wherein said local transfer
elements and said expanded transfer elements are substantially identical.

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19. An interconnect network according to claim 16, wherein said local and said
expanded transfer elements each include mode control means for selecting whether said
20 transfer element is to be employed in one of said local interconnect modules or in said
expanded interconnect module.

20. A dynamically scalable communication interconnect comprising,
25 a selectable number of local interconnects, each having associated transfer
elements for transferring information through said associated local interconnect, and
a single expanded interconnect, including elements for coupling to said selected
number of local interconnects, and expanded transfer elements for transferring
30 information between said local interconnects, wherein said selected number of local
interconnects can be varied while said expanded interconnect is operating transferring
information.

21. An interconnect network for operation within a communication node, said network comprising,

5 a selectable number of local interconnect modules each having local transfer elements for transferring information between a plurality of local I/O channels and for transferring information between said plurality of local I/O channels and a plurality of non-local I/O channels, wherein said interconnect network is adapted for transferring information as information cells, each of said cells including groups of information
10 words,

an expanded interconnect module having coupling means for electrically coupling to said non-local I/O channels, and expanded transfer elements for transferring information between said local interconnect modules, and

15 redundancy generating means for generating an alternative version of information being transferred out of said interconnect network by generating a bit-by-bit "exclusive-or" between pairs of said groups of information words included in an information cell.

20 22. An interconnect network for operation within a communication node, said network comprising,

25 a selectable number of local interconnect modules each having local transfer elements for transferring information between a plurality of local I/O channels and for transferring information between said plurality of local I/O channels and a plurality of non-local I/O channels,

30 an expanded interconnect module having coupling means for electrically coupling to said non-local I/O channels, and expanded transfer elements for transferring information between said local interconnect modules, and

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a local interconnect module, associated with each of said selected number of local communication modules, and having local transfer elements for transferring

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information between said plurality of internal communication channels of said associated local communication module, and

an expanded interconnect module, including means for coupling to each of said
5 local interconnect modules, and expanded transfer elements for transferring information between said local interconnect modules, thereby enabling transfer of information between external communication channels of different ones of said selectable number of local communication modules.

10 ~~25.~~ A dynamically bandwidth scalable communication node having a modular construction and comprising,

a selectable number of local communication modules, each module having a plurality of communication channels for transferring information into and out of said
15 node,

a local interconnect module coupled to each of said local communication modules and including local transfer elements for transferring information between said plurality of communication channels,
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an expanded interconnect module having elements for coupling to a plurality of said local interconnect modules, and transfer elements for transferring information between said plurality of local interconnect modules, wherein information can be transferred between communication channels of different ones of said local
25 communication modules.

~~26.~~ A method for transferring information signals between I/O channels of an interconnect network adapted for operation in a communication node, said method comprising the steps of,
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coupling information to I/O channels of one or more proximately located local interconnect modules,

transferring information between I/O channels of a particular local interconnect module in response to a local destination address,

5 transferring information from one of said local interconnect modules to an I/O
channel of a proximately located expanded interconnect module in response to a non-
local destination address,

transferring information from said expanded interconnect module to a particular
10 one of said local interconnect modules in response to said non-local destination address,

scaling bandwidth of said interconnect network by including a selected number of said local interconnect modules in said plurality of local interconnect modules.